



Surgical Approaches to the Lesions of the Cervicothoracic Junction with Spinal Canal Compromise

Spinal Kanalı Dolduran Servikotorasik Bileşke Lezyonlarına Cerrahi Yaklaşımlar

Servikotorasik Bileşkeye Cerrahi Yaklaşımlar / Surgical Approaches to the Cervicothoracic Junction

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Özet

Amaç: Servikotorasik bileşke lezyonlarına cerrahi yaklaşım spinal cerrahinin en yaygın problemlerinden biridir. Bu bölgeye cerrahi yaklaşım geleneksel olarak anterior ve posterior yaklaşımlar olarak ayrılmıştır. Laminektomi gibi posterior yaklaşımlar sıklıkla uygulanır ve tüm spinal cerrahlar tarafından iyi bilinir. Bununla birlikte bu yaklaşım anterior vertebral yapıları kötü bir yaklaşım sağlar. Laminektomi yoluyla anterior patolojilere ulaşmak zor olabilir. **Gereç ve Yöntem:** 1996 ve 2005 yılları arasında Ankara üniversitesi tıp fakültesi nöroşirürji bölümünde 39 hasta anterior ve posterior yaklaşım kullanılarak ameliyat edildi. **Bulgular:** Nörolojik defisitli 38 hastadan, 21 hasta anterior ve anterolateral yaklaşım; 3 hasta posterolateral yaklaşım ve 14 hasta laminektomi geçirdi. Nörolojik defisiti olmayan 1 hasta hem anterior ve hemde posterior yaklaşım geçirdi. **Sonuç:** Yalnızca laminektomi geçiren hastalarda gelişen deformite olanların nörolojik durumunu kötüleştirdi. Oysaki anterior yaklaşımlar dirençli ağrıyı kontrol ederek ve hareketi koruyarak veya onararak hastaların yaşam niteliğini kayda değer olarak düzeltti ve morbidite ve mortalite oranlarını kabul edilebilir oranlara çekti. Bununla birlikte en uygun yaklaşım seçeneği patolojik etkenin lokalizasyonudur.

Anahtar Kelimeler

Anterior Yaklaşım; Posterior Yaklaşım; Servikotorasik Bileşke; Spinal Patoloji

Abstract

Aim: Surgical access to cervicothoracic junction pathologies is one of the most common problems in spinal surgery. The surgical approaches to this region have been traditionally divided into anterior and posterior approaches. Posterior approaches such as laminectomy are applied frequently and are well known by all neurosurgeons. However, this approach provides poor exposure to the anterior vertebral elements. Accessing to ventral pathologies thorough laminectomy may be difficult. **Material and Method:** Between 1994 and 2005, 39 patients having pathologies in cervicothoracic junction were operated on by using anterior and posterior approaches in Neurosurgical department of Ankara University. **Result:** In 38 patients with neurological deficit, 21 patient were applied anterior and anterolateral approaches, posterolateral approach in 3 patients and posterior approach such as laminectomy in 14 patients. A patient without neurological deficit underwent combined (anterior and posterior) approach. **Discussion:** The patients undergoing solely laminectomy, progressive deformity developed and their neurologic conditions were deteriorated while the results suggest that anterior approaches improved the quality of life considerably in patients with spinal lesions by restoring or preserving ambulation and by controlling intractable spinal pain with acceptable rates of morbidity and mortality. However, appropriate choice of surgical approach depends on the location of the pathologic process.

Keywords

Anterior Approach; Posterior Approach; Cervicothoracic Junction; Spinal Pathologies

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Introduction

Surgical access to cervicothoracic region through standard approaches may be difficult. Several approaches such as anterior, anterolateral, posterolateral and posterior approaches have been described [1]. The posterior approach such as laminectomy is well known and are the most frequently applied procedure by neurosurgeons. The primary tumors and spinal metastasis can invade the vertebral body. The 80 % of spinal metastasis involved the vertebral bodies rather than posterior vertebral elements [2]. Tumors including the vertebral bodies in the cer-

Material and Method

Between 1994 and 2005, 39 patients with pathologies in cervicothoracic junction were operated on by using anterior and posterior approaches in Neurosurgical department of Ankara University. The surgical procedures applied to the patients are summarized in table 1. 15 of the patients operated were women, 24 were men and the mean age of them was 42, ranging from 32 to 65. There were tumors in 28 patients, pott disease in 9 patients and cyst hidatic in 2 patients. The surgical approaches carried out and types of pathologies are indicated in

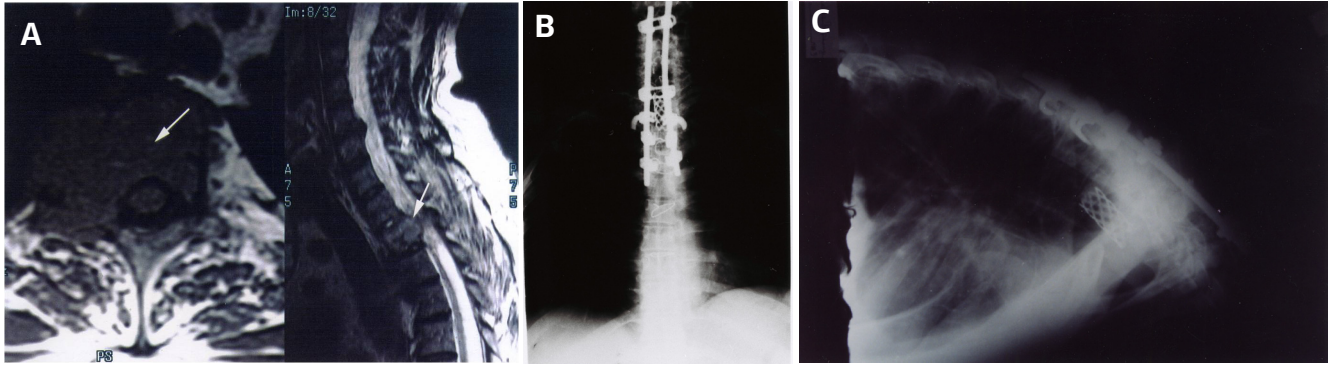


Figure 1. Sagittal and axial T1-weighted MRI with gadolinium demonstrating an isointense tumor involving T2 vertebral body (A). Postoperative anteroposterior and lateral radiography demonstrating methylmethacrylate – cage construct and plate fixation (B, C).

vicothoracic region occurs approximately 15% of spinal tumors [3]. The necessity of surgical approach to this region have led to the development of various extensive techniques [4]. The anterior approaches, transmanubrial - transclavicular approach, anterolateral thoracotomy, low anterior cervical approach and lateral parascapular extrapleural approach, provide the most direct route to the spinal column for decompression and reconstruction. However, posterior approaches are restricted only in excision of the posteriorly located lesions [5]. In this study, the results of anterior and posterior approaches applied to the cervicothoracic junction in our department have been compared.

table 2. Surgically, 21 patients were applied corpectomy, fusion, and plate fixation by anterior and anterolateral approaches such as transmanubrial - transclavicular approach, anterolateral thoracotomy, low anterior cervical approach, and lateral parascapular extrapleural approach, 14 patients underwent only laminectomy, one patient was performed corpectomy, fu-

Description	Grade
Complete motor and sensory loss	A
Complete motor loss and sensory preserved	B
Nonfunctional motor preserved	C
Weak functional motor preserved	D
Normal motor and sensory function	E

sion, and stabilization by combined approach (anterior and posterior). 3 patients undergoing posterolateral approach were carried out partial corpectomy, reconstruction, and plate fixation.

These patient's records were retrospectively reviewed. The data about the patient age and gender, type of lesion, neurological examination, appropriate laboratory findings, surgical findings, postoperative complications and neurological outcome and excision form of lesion were collected. Patients were evaluated as clinic and radiologic at 6- month intervals for the first year at postoperative stage. Patients' neurological functions were graded according to the Frankel classification. The Frankel scale was used for the preoperative and the postoperative assessment of each patient's neurological status (Table 3). Postoperative pain and neurological status were evaluated for each patient (Table 4). The results are excellent if complete recovery and returning to previous activities are provided; if the patient has occasional pain and returning to acquired activities by using mild analgesic intermitantly, the result is good; if there is moderately recovery, frequent use of analgesics and modified activities, the result is fair; and if there are no relief in original symptoms, constant pain, the result is poor.

Table 1. The surgical procedures applied to the patients

Type of surgical approach	Numbers of patients
Transmanubrial - transclavicular approach	3
Anterolateral thoracotomy	13
Lateral parascapular extrapleural approach	2
Low anterior cervical approach	3
Posterolateral approach	3
Laminectomy	14
Combined approach	1

Table 2. The surgical approaches and types of pathologies

Pathology	Anterior approach	Posterior approach	Posterolateral approach	Combine approach	Total
Metastasis of breast tumor	4	2			6
Metastasis of lung tumor	6	5			11
Hematopoethic cancer metastasis		2			2
Adenocarcinoma with unknown origin	2	1			3
Prostate tumor metastasis		3			3
Hemangioma			2		2
Chondroblastoma				1	1
Pott disease	9				9
Cyst hydatic		1	1		2

Table 4. Postoperative pain and neurological status

Result	Clinical condition
Excellent	If there is complete recovery
Good	If the patient has occasionally pain
Fair	If there is partially recovery
Poor	If there is no relief in original symptoms

Table 5. Results of the patients at postoperative stage

Type of approach	Completely improve	Partially improve	Same remain	Poor
Anterior approach	16 patients	2 patients	3 patients	
Posterolateral approach			3 patients	
Posterior approach	5 patients		7 patients	2 patients
Combined approach	1 patient			

nence, were remained same (grade C). In posterior approach, 5 patients were completely improved (increased from grade D to E), 7 patients were not improved (remained same at grade C), and 2 patient were neurologically deteriorated (reduced from grade D to C). In the cases applied posterolateral approach, 3 patients were remained same (grade D). The a patient undergoing combine approach was improved (increased from grade D to E) (Figure 1) (Table 5). None of the patients was observed postoperative complications. The pain was significantly relieved in 16 patients operated via anterior approach, relatively relieved in 3 patient and unchanged in 2 patient. The pain was relieved in the 5 of 14 patients undergoing posterior approach (laminectomy), remained same in 7 patients and worsened in 2 patients. The pain were not changed in 3 patients undergoing posterolateral approach. In a patient who underwent combined approach, the pain was relieved and neurological function was significantly improved. In majority of these patients undergoing anterior approach neurological function was increased 1 or 2 point.

Discussion

Pathologies of cervicothoracic junction are rare. The most common cause of spinal cord compression at this level is direct extension of paraspinal tumors. Accessing to the anterior aspect of the cervicothoracic junction is difficult and potentially dangerous because of nearby vital structures [6]. Although posterior decompression alleviate the neurological loss at the beginning, total excision of mass can not be performed. Laminectomy can produce spinal instability because of removal of the supporting spinal elements, which may potentially worsen patient's neurological status [2]. Because the anterior approach provides the best access to the pathologies involving anterior spinal elements, sufficient exposure can be achieved for decompression of lesions involving the vertebral body, and permits to maximum resection of tumors with anterior and anterolateral extend. The spinal cord can be decompressed and done spinal reconstruction and plate fixation by anterior approaches, can be supplied the best visualition of ventral vital soft tissue structures and obtained proximal control of significant vessels early. Predominantly, ventral diseases are the main indication for anterior approach, but laminectomy is not the proper surgical procedure due to inadequate surgical exposure [7]. All the patients undergoing multiple hemylaminectomies or corpectomy should be done both anterior and posterior internal fixation to prevent progressive kyphosis because of mobil cervical region and rigid thoracal region, but both anterior and posterior fixation is not

Result

The pain was the most frequent complaint of the patients with spinal lesions. All of these patients were suffered from either local or radicular pain. The majority of the patients had neurological deficits such as monoparesis, paraparesis or incontinence. In postoperative period, 39 patients were followed from 8 to 55 months with aware of 20 months. The results of the treatment were measured by using three parameters: 1) pain relief 2) improvement of motor function 3) improvement of radiologic appearance. By Using these criteria, The patients were classified according to Frankel scale after the surgery. In anterior approaches, 16 patients were observed neurologically improvement (increased from grade D to E), 2 patient were partially improved (increased grade C to D), 3 patient, having paraparesis and urine inconti-

possible. [8]. The surgical approach was determined according to the location of lesion and compression of neural elements and Indication for surgery were symptomatic spinal cord compression and intractable spinal pain.

Conclusion

Although accessing to cervicothoracic junction pathologies comprising spinal canal is difficult, anterior approach should be definitely considered for the appropriate treatment. In cervicothoracic junction pathologies laminectomy and posterolateral approach has a limited indication and many disadvantages such as accessing to the pathology indirectly, inadequate decompression of spinal cord, insufficient pain relief, incapable of neurological improvement.

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